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October 30, 2002

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U.S. Department of Transportation
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Subject: Libby, Montana Asbestos Project
Former Screening Plant Site (Operable Unit 2)
Rainy Creek Intake

Dear Mr. McGuiggin and Ms. Borgesi:

The owners of the Screening Plant property have water rights to Rainy Creek. Rainy Creek and the Kootenai River were used as sources of water for irrigating/sprinkling their property and watering nursery stock. One of the intakes is located on National Forest Service property near the edge of the paved portion of the haul road to the abandoned mine site, about ¼ mile upstream from Highway 37. CDM Federal Programs Corporation (CDM) field staff obtained GPS coordinates of the intake location upstream of Highway 37. Digital photographs of the upstream intake are attached for your information. The upstream intake consists of a 2-inch nominal diameter polyethylene pipe with a basket strainer on the end of the pipe. The mesh size of the basket strainer is approximately ¼ inch and is sufficient to prevent small stones, sticks, and leaves from getting into and clogging the pipeline. The existing upstream screen has no means of filtering asbestos fibers from the creek water, preventing them from entering the pipe and flowing down to the irrigation system on the remediated Screening Plant property.

The second Rainy Creek intake is on Screening Plant property, just downstream of Highway 37. We understand that taking water from Rainy Creek at the downstream intake was accomplished by setting a portable pump in the creek. There likely was a screen or strainer on the pump intake at this downstream location. However, like the upstream intake, we are not aware of any measures used to filter asbestos fibers from the creek water during previous withdrawals of water from the downstream intake.



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Asbestos fibers have been found in the creek water, creek sediments and in the vicinity of the existing intakes for the following reasons:

- The upstream intake is located close to the mine haul road. Soil samples collected along the mine haul road were found to contain asbestos fibers.
- Rainy Creek originates close to the abandoned mine site where airborne dust was frequently present in the environment during mining operations. Wind blown asbestos fibers have likely settled in drainage areas tributary to Rainy Creek.
- Water and sediment samples obtained from water and sediments in Rainy Creek in 2001 were found to contain asbestos fibers. The concentration of asbestos fibers in Rainy Creek water ranged from 0.78 to 15.20 million fibers per liter (MFL). The concentration of asbestos fibers in sediment samples obtained from Rainy Creek ranged from non detectable to 2 percent asbestos. The attached figure shows the locations and results of the Rainy Creek water and sediment sampling.
- Sediment samples obtained from Rainy Creek on the Screening Plant property were found to contain asbestos fibers.
- A water sample collected from Rainy Creek at the downstream end of the concrete culvert under Highway 37 was found to contain 15 million asbestos fibers per liter.

The property owners have requested EPA reconnect the gravity fed water supply from the upstream Rainy Creek intake to the new irrigation system being installed on the Screening Plant site as part of the restoration work. EPA and the property owners realize that asbestos fibers would be reintroduced to the remediated Screening Plant property if irrigation water was obtained directly from the Rainy Creek as it had been in the past. EPA requested CDM investigate the feasibility of filtering asbestos fibers from the Rainy Creek intakes prior to irrigation and sprinkling on the Screening Plant property.

CDM considered several concepts for providing asbestos free water from Rainy Creek to the irrigation system on the remediated Screening Plant property. Strategies ranged from revegetating the property with indigenous plantings that would not require irrigation to designing and constructing a small filter building with wet well and pumping system. The



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revegetation alternative is not implementable given property owners' specific requirements for the types and species of grass seed for the property. The filter building was not considered an economically viable as overhead electric service would need to be provided to the upstream intake location on National Forest Service property at a cost of \$25,000 to \$50,000. Underground electric service would cost even more. The filter building would be constructed in a Level C environment and would require regular O&M services. Lastly, due to its relatively remote location, the building would be vulnerable to vandalism.

More viable solutions centered on two approaches:

- Disposable cartridge type filters
- Slow sand filtration

The Maximum Contaminant Level (MCL) for asbestos fibers in drinking water is 7 million fibers per liter of structures greater than 10 microns in size. Typically, 5-micron size filters are used to filter asbestos fibers from drinking water sources. Most water supplies are located where asbestos removal is not a major concern. Using filters with smaller pore sizes typically results in restricting water flow in such a manner as rendering the source useless. During building demolition activities at the Screening Plant site, filtering water from Rainy Creek through a 5-micron filter resulted in detection of asbestos fibers in ambient air. The removal contractor tried filtering the Rainy Creek water through a 0.5-micron filter, but flow through this filter was so restricted that it proved ineffective at providing the necessary flow rate and volume of water needed to effectively control dust emissions from building demolition and soil excavation activities. The removal contractor then obtained water from the Kootenai River, at the required flow rate and volume, without detection of asbestos fibers in the air. Although some asbestos fibers as large as 80 microns in size have been found during sampling activities in Libby, the majority have been in the 0.5 to 5 micron size range. Using an in-line or cartridge type mechanical filter 5 microns in size is therefore not a feasible alternative since the microscopic openings in the filter would not capture asbestos fibers less than 5 microns in size and they would be reintroduced to the Screening Plant property through the irrigation/sprinkler system. Using a 0.5 micron cartridge type filter in the existing 2 inch gravity flow pipeline would reduce the flow to the Screening Plant property to such an extent that the irrigation/sprinkler system would not operate effectively. Either size filter would be prone to clogging and require frequent filter replacement. A series of filters



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with progressively smaller filter openings could be tested to see if they could provide effective removal of asbestos fibers. In any case, spent filters would need to be disposed of as asbestos containing material and the more filters used, the more maintenance required.

The concept of sand filtration may be approached by either installing several vertical wells adjacent to the creek or one or more horizontal perforated pipes below the creek bottom. Water seeping through the creek bottom would be collected by the wells or perforated pipes, connected to a header, and connected to the existing 2-inch pipe for gravity flow to the remediated Screening Plant property. Either approach would require detailed engineering investigation in Level C personal protective equipment before a sand filtered intake could be designed. Our preliminary investigations focused on a slow sand filter above one or more horizontal pipes below the creek bottom as requested by EPA.

We consulted with one of our specialists in water filtration and learned that gravity sand filters are known to achieve 96.8 percent or better removal of particles 7 to 12 microns in size in water which has been pretreated with chemical coagulation^[1]. Particles smaller than 7 to 12 microns in size would pass through the sand filter until a layer of biological growth formed on the surface of the filter media. Once established, this biological layer would become the predominant filtering mechanism^[2]. Buildup of this biological layer would need to be monitored and maintenance, i.e. removal and disposal of the growth as an asbestos containing material. The frequency of maintenance would depend upon how quickly the growth develops and the consequent reduction in water flow. Slow sand filter systems generally include twin filters so that when the buildup of the biological layer thickens to the extent that pressure drops and reductions in water flow through the sand filter are detected, water can be filtered through the second filter while the first is cleaned.

[1] Pontius, Frederick W., Tech. Ed., American Water Works Association, Water Quality and Treatment - A Handbook for Community Water Supplies, 4th edition, McGraw-Hill Inc., New York: 1990.

[2] American Water Works Association - American Society of Civil Engineers, Water Treatment Plant Design - 3rd edition, McGraw-Hill Inc., New York: 1997.



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We discussed the concept of a slow sand filter with Prof. Robin Collins at the University of New Hampshire. Prof. Collins noted that slow sand filters are effective in removing *E. coli* bacteria thereby reducing chlorination requirements in municipal water systems but did not know of any studies or literature documenting specific applications of a slow sand filter being used to remove asbestos fibers from water. Prof. Collins did feel that a slow sand filter may be used for removal of asbestos fibers because the fibers are positively charged and would be expected to be captured by the negatively charged organic material, microbes, and bacteria that make up the biofilm layer or "schmutzdeck" that develops over time on the surface and to some depth of the sand. Prof. Collins indicated that pilot testing would be necessary to determine the proper sand grain size, and ripening time needed to develop the schmutzdeck. The pilot tests would also be needed to determine the effectiveness of the slow sand filter (influent/effluent tests) in removing asbestos fibers and to determine the frequency that the schmutzdeck would need to be scraped off the sand and disposed. Pilot studies would also be needed to balance head losses through the slow sand filter, flow, and hydraulic grade line to operate the irrigation/sprinkler system.

Assuming the results of the pilot testing of the slow sand filter(s) were favorable, cost estimates for design and construction would be performed. Installation of a temporary creek bypass pumping system and construction of the slow sand filter system would be performed in Level C personal protective equipment and require the creek bottom to be excavated and soil disposed of at the abandoned mine site. Sand of the grain size determined in the pilot testing program would be installed above the perforated pipe(s). The pilot testing would also determine if the slow sand filter system could be installed outdoors, or if a metal building would be needed to house the filters. This aspect of the pilot studies would need to focus on the situation where drawing water from the creek would vary seasonally. In times when the filter system was not in operation, i.e. late fall, winter and early spring, the slow sand filters would need to be shut off. Engineering and hydraulic analyses and evaluations would be needed to determine the size and number of pipes needed, to provide flow equal to that of the existing pipe flowing full. Pipe connection details would also be developed. Once the installation was complete, it would be tested and, if sufficient flow was not provided, additional perforated pipes installed.



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In summary, detailed pilot studies would be needed to:

1. Confirm that the slow sand filter system described above, or a variation thereof, would be capable of removing all asbestos fibers from water obtained from Rainy Creek. The estimated costs of these pilot studies could range from \$25,000 to \$50,000.
2. Assuming the first phase of the pilot studies indicate that asbestos fibers could be effectively removed from the Rainy Creek upstream intake, the size of the sand grains needed would be finalized and the design criteria for the slow sand filter(s) developed. At this point, the determination of whether the filters could be an outdoor installation would be determined. The estimated costs of these pilot studies could range from \$5,000 to \$10,000.
3. A hydraulic engineering analysis would need to be performed to determine the required flow rate through the filters and the size of the filter(s) needed. A determination would need to be made at this time with respect to year round operation or seasonal operation with a bypass of the filter(s) when not in use. The estimated costs of these pilot studies could range from \$4,000 to \$5,000.
4. Design drawings and technical specifications would be prepared at this stage of the project. An O&M plan for the filter(s) would be developed at this time. Procedures for periodic cleaning/scraping off of the biofilm layer and disposal as an asbestos waste would be developed. The cost of this work is estimated to range from \$10,000 to \$20,000.
5. Once the pilot studies and design is complete, the slow sand filter system could be constructed. Construction costs are estimated to range from \$25,000 to \$50,000.

The estimated cost to complete the pilot testing, design engineering, and construction of a slow sand filter system as described conceptually above, seem to far outweigh the benefits of restoring the gravity fed water supply to the Screening Plant property. Water samples obtained from the Kootenai River have exhibited non-detect results when analyzed for asbestos fibers. The restoration of the Screening Plant includes installation of two pumps and intakes from the Kootenai River for supplying water to the irrigation/sprinkler system. Although the property owners have offered to replace cartridge type filters and have been OSHA trained, there is no guarantee that this will be done by future property owners. EPA



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would need to institute some type of monitoring program to document that the property does not become recontaminated with asbestos due to lapses in maintenance or malfunctions in the filter operation. A qualitative analysis suggests that the costs of conducting the pilot tests, designing the filter system, construction of the filter(s) on National Forest Service property in a Level C environment, regular operation and maintenance for as long as the filtration system remains in use far outweigh the benefit of having a gravity fed water supply to the Screening Plant property rather than using electric pumps to obtain irrigation water from the Kootenai River. CDM believes that the risk of reintroducing asbestos fibers to the remediated Screening Plant property through irrigation water would be reduced substantially if water was obtained from the Kootenai River rather than from Rainy Creek. Until the waters and sediments of Rainy Creek are determined to be free of asbestos fibers, CDM recommends that the two pumps and intakes from the Kootenai River that will be installed as part of the Screening Plant property restoration be used to supply water to the irrigation/sprinkler system.

Please contact me at 617-452-6270, or Tim Wall at 617-452-6257, with any questions or comments on this matter.

Very truly yours,

A handwritten signature in cursive script that reads 'Peter J. Borowiec, Jr.'.

Peter J. Borowiec, Jr., P.E.
Task Manager
CDM Federal Programs Corporation

cc: Timothy B. Wall (CDM Cambridge)
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